DOCUMENT RESUME

ED 151 663 CG 012 260

AUTHOR Sheehan, Nancy W.
TITLE Performance Factors and Correlates of Piagetian Logical Functioning in Elderly Women.
PUB DATE Mar 77
NOTE 13p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (New Orleans, Louisiana, March 17-20, 1977)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Abstract Reasoning; *Age; Cognitive Measurement; Females; *Logical Thinking; Neurological Organization; *Older Adults; *Performance Factors; Research Projects; *Thought Processes
IDENTIFIERS *Piaget (Jean)

ABSTRACT

This study examines the influence of selected performance factors and social role participation upon Piagetian cognitive funcitoning during the aging years. By administering a battery of concrete and formal reasoning tasks and measures of fluid intelligence, the effects of varying instructional set and age of E on the cognitive performance of 80 community-living elderly female participants were examined. Piagetian reasoning abilities were consistently related to both measures of fluid intelligence. The relationship between performance and social role participation, however, was inconsistent. A subsequent common factor analysis obtained three factors to describe the interrelationships among the measures: a fluid intelligence factor upon which most Piagetian measures loaded; a social participation factor; and an infralogical-experiential factor. The general ineffectiveness of either factor in altering performance may be due to the strong influence of fluid factors upon Piagetian performance. The observed relationship between certain tasks and social role measures suggests the need for a closer examination of requisite skills and possible environmental supports which may facilitate maintenance of certain abilities during the aging years. (Author)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED151663

PERFORMANCE FACTORS AND CORRELATES OF PIAGETIAN LOGICAL FUNCTIONING IN ELDERLY WOMEN*

Nancy W. Sheehan
Human Development and Family Relations
University of Connecticut

*Paper presented at the biennial meeting of the Society for Research in Child Development March 1977

CG 012260

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

N.W. Sheehan

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

Introduction

In the past several years, there has been a growing body of speculation concerning possible explanations for the "apparent" decline of Piagetian abilities noted during the aging years. There is little agreement, however, regarding the nature and possible determinants of these apparent changes.

Earliest speculation, such as that of Hooper, Fitzgerald and Papalia (1971) postulated that lowered cognitive performance among the elderly represented regression of logical abilities due to their strong reliance upon fluid intellectual factors. Later accounts concerning cognitive abilities of the elderly have cautioned against such hasty conclusions without increased attention to possible situational factors which may affect the elderly's performance in the testing situation (Baltes & Labouvie, 1973; Eisner, 1974; Rubin, 1976). Following this latter view, some Piagetians see apparent cognitive decline as nothing more than a widening gap between structural competence and the performance manifestation of the structure (Bearison, 1974). Additional discussion has postulated the role of specific factors such as neurological impairment (Eisner, 1973), the effects of social isolation (Denny, 1974; Rubin 1973) or "terminal drop" (Papalia & Bielby, 1974) as responsible for the apparent decline.

A review of research dealing with logical reasoning abilities in the elderly, however, fails to provide conclusive evidence to support any speculation regarding the nature or possible determinants of the apparent changes. Proponents of a decrement model of logical abilities cite evidence of the relationship between Piagetian abilities and fluid intellectual factors as supportive of this view. Furthermore, cross-sectional data on logical reasoning in children, adults and the elderly have noted similar factor structures for children and the elderly in contrast to those noted for adults (Muhs, et al., 1976).

Conversely, training studies claim to provide support for the performance—competence view. These studies, however, have generally failed to note evidence of far transfer to other related tasks (Denny, 1974; Schultz & Hoyer, 1976; Tomlinson-Keasey, 1972). Obviously, the performance—competence view is a highly problematic one in that any assessment of structural competence necessitates some performance measure. From this perspective, however, it can be argued that performance factors which may inhibit cognitive performance must be elininated from the testing situation. The few studies which have altered aspects of the testing situation have reported mixed results. While two studies which altered task format found no effect due to this manipulation (Kominski & Coppinger, 1968; Muhs, et al., 1976), a third which provided supportive task instructions reported a significant effect (Garber, et al., 1974). The results of this latter study, however, must be interpreted with some caution due to the presence of an unacknowledged training component in the task battery as well as the failure to include a control group.

Other factors hypothesized to affect cognitive performance (e. g., neurological intactness, social participation, and terminal drop) have yet to be systematically investigated.

The present study attempted to address some of the issues discussed previously concerning the influence of performance factors, social role participation and neurological impairment on cognitive performance among community-living elderly. Specifically, there were the four following major objectives in the present study:

1. To determine the effects of two performance factors (age of interviewer and instructional set) upon cognitive performance.
2. To assess the relationship between both past and present levels of social role participation and cognitive performance.

3. To examine the relationship between neurological impairment and cognitive performance.

4. To assess the interrelationships among the dependent measures through the use of factor analysis.

Methods and Procedures

Eighty community-living elderly females ranging from 62 to 88 years of age ($\bar{X}$=72.9) participated in the study. The mean level of education for the sample was 12.8 with a range of 8 to 20 years. Participants were contacted through local senior citizen centers and social service agencies serving the elderly in Madison, Wisconsin.

Tasks

A battery of Piagetian concrete and formal operations tasks was administered including dichotomies, multiple seriation, transitivity, weight conservation, class inclusion, combinatorial reasoning, and volume conservation. In addition, two measures of fluid intelligence, the Raven Coloured Progressive Matrices Test and the Visual Orientation Memory Test (Swinton, 1973) were administered.

Measures of social role participation assessed the level of present role participation, adulthood levels of role activity and changes in an individual's life space from middle-age. The social role measures employed were the Pre-Entry Index and the Adulthood Index (Granick & Nahemow, 1961), and Perceived Life-Space (Cumming & Henry, 1961). Finally, the Mental Status Questionnaire (Kahn, et al., 1966) was administered to determine the presence of neurological impairment.

Design

To test the major hypotheses of the present study concerning the effects of age of tester and instructional set, a 2 x 2 factorial design was employed utilizing "young" and "old" testers and standard and supportive task instructions. Specifically, it was hypothesized that participants tested by a

tester closer in age to themselves would perform significantly better than those tested by a "young" tester. Concerning instructional set, it was hypothesized that participants given supportive instructions would perform better than those who received standard task instructions.

Eight female testers administered the task battery, four of whom were "young" testers and four, "old" testers. Participants were randomly assigned to the testers. Within each condition, half of the participants received standard task instructions while half received "supportive" instructions.

The mean age of the young testers was 32 years of age, while the mean age of the older testers was 66.5 years. Testers were similar in educational level and all testers had some interviewing experience. One difference between the young and old testers indicated that none of the older testers had testing experience while several younger testers reported this experience. All testers were trained individually to administer the tasks over a period of three testing sessions.

The two variations in instructional set, standard vs. supportive, were as follows: Standard: "I am going to give you some tests previously used with younger people to see how you do on them." Supportive:

> "We really appreciate your cooperating with us. Some people think that elderly people are not able to think clearly. We don't believe this. We believe that older people are still alert and mentally active. We ask you help in proving us correct.
>
> I am going to give you a series of problem-solving tasks. Some will be easy, while others will be more difficult. For each question you are being asked to decide about, think very carefully. Are there any questions?"

Supportive instructions were adapted from those employed by Garber, Simmons, and Robinson (1974).

Results

Preliminary analysis of the data for overall tester effects indicated that one older tester was significantly different from all other testers ($F=3.39$, $df=15/62$, $p<.001$). Consequently, this tester was eliminated and subsequent analyses were based upon the reduced sample ($N=70$).

To test the specific hypotheses, a 2 x 2 analysis of covariance with education as the covariate for all cognitive measures was performed. No significant effects were noted due to either age of tester or instructional set. Although the effect of tester did not reach the level of significance ($p<.11$), an inspection of the group means indicated the superior performance of the group tested by "older" interviewers.

Subsequent analyses examined the effects of the two performance factors on the subset of Piagetian measures. With age as the covariate, a significant effect of age of tester was noted ($F=2.13$, $df=7/59$, $p<.05$). Inspection of the univariate F's indicated dichotomies and transitivity contributed significantly to this overall effect. Analyses performed with education as the covariate revealed no significant effect due to either factor. A final analysis employing age and education as covariates indicated no effect due to instructional set or age of tester.

The second major objective concerned assessment of the relationship between level of social role participation and cognitive performance. Of the three measures of social role participation only the index of adulthood role

participation was significantly correlated with any of the cognitive measures. Pearson correlations between past participation in adult roles and cognitive performance were significant for the measures of dichotomies and combinatoral reasoning, r=.35 and r-.31, respectively ($p < .01$).

Responses to the Mental Status Questionnaire showed no evidence of the presence of neurological impairment among the participants. Due to the lack of variability, the relationship between cognitive performance and neurological intactness could not be assessed.

Finally, the principal components method was used to factor analyze the data. An initial solution obtained an unrotated factor matrix of five factors. Inspection of the eigenvalues for discontinuity indicated a trial solution for three factors. A second analysis specifying eigenvalues of 1.5 or greater revealed three factors which accounted for 43.4 per cent of the total variance. Factor loadings of .30 or greater were considered significant when interpreting the factors.

Factor 1, "Fluid Intelligence" revealed highest loadings for the two measures of fluid intelligence, the VOMT and the RCPMT. In addition, four of the seven Piagetian measures (combinational reasoning, transitivity, class inclusion and multiple seriation) loaded on this factor. Chronological age had a strong negative loading. The second factor, "Infralogical-Experiential" indicated highest loadings on weight conservation and education with moderate loadings from adulthood role participation, dichotomies and volume conservation. The final factor, "Social Role Participation," consisted of high loadings of two social measures, the Adulthood Index and present role activity.

Discussion

The major debate among Piagetian researchers concerns the relative influence of neurologically-derived factors vs. environmental factors upon

Piagetian functioning in the elderly. Those who argue that the observed cognitive decline may be due primarily to age-related changes in susceptibility to environmental influences suggest factors such as social isolation or non-cognitive aspects of the testing situation. Those who propose neurologically-derived factors indicate that the decline in cognitive performance may be explained by "terminal drop" (Papalia & Bielby, 1974), the reliance of Piagetian logical abilities on fluid intelligence (Hooper, et al., 1971), or the presence of neurological impairment (Eisner, 1973). Few research investigations have attempted to test such speculation. Furthermore, a review of those which have examined certain proposed factors fails to provide conclusive evidence to support any speculation.

Acknowledging the inherent limitations of the design to address the issue of age changes, the present investigation sought to explore systematically the relationships between cognitive functioning and both selected environmental factors (performance factors in the testing situation and social role participation) and neurologically-derived factors (fluid intellectual ability and neurological impairment).

The present study found no evidence to support speculation that the two performance factors, age of interviewer and instructional set, affected the cognitive performance of the participants. These findings stand in contrast to recent discussion on the need to match age of interviewer with age of participant (c.f., Rubin, 1976) or claims that providing supportive task instructions will significantly improve cognitive performance (Garber, et al., 1974).

Assumptions such as these regarding the plasticity of cognitive functioning rest upon the existence of a "discernable" gap between the individual's level of competence and her/his performance manifestation of that competence. A possible explanation for the failure of either manipulation in this study

to alter performance significantly may be that in the case of community-living individuals there may actually be no gap at all between competence and performance levels. In other words, individuals such as those in the present study may be functioning at or near their performance potential (c.f., Lawton & Nahemow, 1973) due to the inherent demands of daily living. That there may be no gap between performance and competence may be particularly true for that segment of the older population which, in fact, does agree to participate in a study of cognitive functioning. Such an assumption concerning a narrow or non-existent gap may not be true for elderly individuals living in much less demanding environments where the environmental press for competent behavior is considerably less, such as individuals living in an institutional environment.

Furthermore, differences in locus of control between institutionalized and community-living elderly.(c.f., Feldon & Kahana, 1974) suggest the greater susceptibility of institutionalized elderly to environmental manipulations.

In addition, the relationship between certain Piagetian abilities and fluid intellectual abilities brings into question assumptions regarding the plasticity of particular logical abilities in the elderly. As the interpretation of the factor analysis indicates, neurologically derived factors and environmental factors (social role participation and education) reveal a differential impact upon certain Piagetian abilities. While the "Fluid Intelligence" factor accounted for the greatest amount of variance, the second factor, "Infralogical-Experiential" revealed the important influence of education and adulthood role participation on several Piagetian measures (dichotomies, weight and volume conservation).

Consequently, as the results of the present study suggest the search for determinants or correlates of cognitive functioning among elderly individuals requires the specification of the ability involved.

Adulthood experiences of the individual may significantly contribute to the maintenance of certain abilities (e.g., conservation and dichotomies) during the latter portion of the life span. For other abilities (e.g., combinational reasoning, transitivity, class inclusion, and multiple seriation), fluid factors (Horn, 1967, 1970) cannot be overcome.

Baltes, P. & Labouvie, G. Adult development of intellectual performance: Description, explanation, and modification. In C. Eisdorfer & M. Lawton (Eds.), The Psychology of Adult Development and Aging. Washington, D.C.: American Psychological Association, 1973.

Bearison, D. The construct of regression: A Piagetian approach. Merrill-Palmer Quarterly, 1974, 20, 21-30.

Cumming, E. & Henry, W. Growing old: The process of disengagement. New York: Basic Books, 1961.

Denney, N. Classification abilities in the elderly. Journal of Gerontology, 1974, 29, 309-314.

Eisner, D. The effect of chronic organic brain syndrome upon concrete and formal operations in elderly men. Unpublished manuscript, William Patterson College of New Jersey, 1973.

Eisner, H. Verbal and nonverbal models of development across the life-span. Paper presented at the meeting of the International Society for the Study of Behavioral Development, Ann Arbor, Michigan, 1974.

Felton, B. & Kahana, E. Adjustment and situationally-bound locus of control among institutionalized aged. Journal of Gerontology, 1974, 29, 295-301.

Garber, E., Simmons, H., & Robinson, P. The effect of task parameters on surface conservation in the elderly. Unpublished manuscript, Cornell University, 1974.

Granick, R. & Nahemow, L. Preadmission isolation as a factor in adjustment to an old age home. In P. Hoch & J. Zubin (Eds.), Psychopathology of Aging. New York: Grune & Stratton, 1961.

Hooper, F., Fitzgerald, J. & Papalia, D. Piagetian theory and the aging process: Extensions and speculations. Aging and Human Development, 1971, 2, 3-20.

Kahn, R., Goldfarb, A., Pollack, M., and Peck, A. A brief objective measure for the determination of mental status of the aged. American Journal of Psychiatry, 1966, 117, 326-328.

Kominski, C. & Coppinger, N. The Muller-Lyer illusion and Piaget's test for the conservation of space in a group of older institutionalized veterans. Unpublished manuscript, College of William and Mary, 1968.

Lawton, M., & Nahemow, L. Ecology and the aging process: In C. Eisdorfer & M. Lawton (Eds.), The Psychology of Adult Development and Aging. American Psychological Association, Washington, D.C., 1973.

Muhs, P., Papalia, D., & Hooper, F. An initial analysis of cognitive functioning across the life-span: Final research report. University of Wisconsin Agricultural Experiment Station Research Project (Hatch) No. 142-1857. Madison, Wisconsin: Child and Family Studies Program, 1976.

Papalia, D. & Bielby, D. Cognitive functioning in middle and old age adults: A review of research based on Piaget's theory. Human Development, 1974, 17, 424-443.

Rubin, K. Decentration skills in institutionalized and noninstitutionalized elderly. Proceedings from the 81st Annual APA Convention, 1973.

Rubin K. Extinction of Conservation: A life-span investigation. Developmental Psychology, 1976, 9, 432.

Schultz, N. & Hoyer, W. Feedback effects on spatial egocentrism in old age. Journal of Gerontology, 1976, 31, 72-75.

Swinton, S. Spatial ability, letter confusion, and beginning reading. Doctoral dissertation, University of Chicago, 1973.

Tomlinson-Keasey, C. Formal operations in females from eleven to fifty-four years of age. Developmental Psychology, 1972, 6, 364.